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RF2369

3V LOW NOISE AMPLIFIER/ 3V PA DRIVER AMPLIFIER

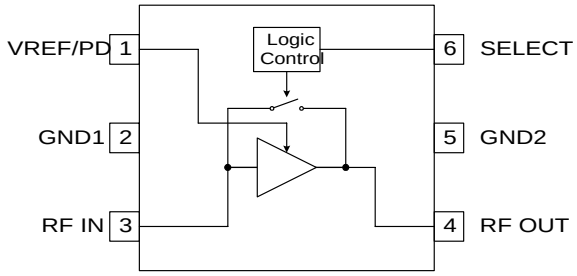
RoHS Compliant & Pb-Free Product
Package Style: SOT 6-Lead

Features

- Low Noise and High Intercept Point
- Adjustable Bias Current
- LNA Bypass Loss is +2dB
- 150MHz to 2500MHz Operation
- Meets IMD Tests with Two Gain States/Single Logic Control Line

Applications

- CDMA/Cellular Bypass LNA
- CDMA/Cellular Bypass Driver Amplifier
- General Purpose Amplification
- Commercial and Consumer Systems



Functional Block Diagram

Product Description

The RF2369 is a switchable low noise amplifier with a very high dynamic range designed for digital cellular applications. The device functions as an outstanding front end low noise amplifier. When used as an LNA, the bias current can be set externally. When used as a PA driver, the IC can operate directly from a single cell Li-ion battery and includes a power down feature that can be used to completely turn off the device. The IC is featured in a standard SOT 6-lead plastic package.

Ordering Information

RF2369	3V Low Noise Amplifier/ 3V PA Driver Amplifier
RF2369PCBA-41X	Fully Assembled Evaluation Board (LNA)

Optimum Technology Matching® Applied

☑ GaAs HBT	☐ SiGe BiCMOS	☐ GaAs pHEMT	☐ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	

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Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	-0.5 to +8.0	V_{DC}
Input RF Level	+10	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EUDirective2002/95/EC (at time of this document revision).

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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					T_{AMB}=25°C, V_{CC}=3.0V
Frequency Range	150	824 to 894	2500	MHz	
Cellular Low Noise Amplifier					
Frequency	869		894	MHz	
HIGH GAIN MODE					Gain Select<0.8V, V_{PD}/V_{REF}=3V
Gain	14.0	15.5	17.0	dB	
Noise Figure		1.6	2.0	dB	
Input IP3	9.0	11.5		dBm	
Input VSWR			2:1		
Output VSWR			2:1		
Current Drain		7.5	10.0	mA	
BYPASS MODE					Gain Select>1.8V, V_{PD}/V_{REF}=0V
Gain	-3	-2	-1	dB	
Input IP3	+10	+24		dBm	
Input VSWR			2:1		
Output VSWR			2:1		
Current Drain		2.0	4.0	mA	
Cellular CDMA Driver					
Frequency	824		849	MHz	
HIGH GAIN MODE					Gain Select<0.8V, V_{PD}/V_{REF}=3V
Gain	14.0	15.5	17.0	dB	
Noise Figure		2.0	2.5	dB	
Output Power	4			dBm	
ACPR1		-65		dBc/30kHz	P_{OUT}=+4dBm, ±885kHz offset
ACPR2		-70		dBc/30kHz	P_{OUT}=+4dBm, ±1.98MHz offset
Input VSWR			2:1		
Output VSWR			2:1		
Current Drain		8.5		mA	
BYPASS MODE					Gain Select>1.8V, V_{PD}/V_{REF}=0V
Gain	-3.0	-2.0	-1.0	dB	
Input IP3	+10	+24		dBm	
Input VSWR			2:1		
Output VSWR			2:1		
Current Drain		2.0	4.0	mA	

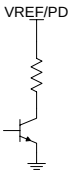
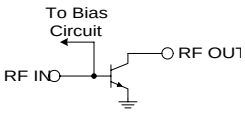
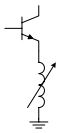
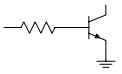
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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Power Supply					
Voltage (V_{CC})		3		V	
V_{SELECT} Low			0.8	V	High Gain mode. Select<0.8V, V_{PD}/V_{REF}=3V
V_{SELECT} High	1.8			V	Low Gain mode. Select>1.8V, V_{PD}/V_{REF}=0V
Power Down	0		10	µA	Gain Select<0.8V, V_{PD}/V_{REF}=0V, V_{CC}=0V

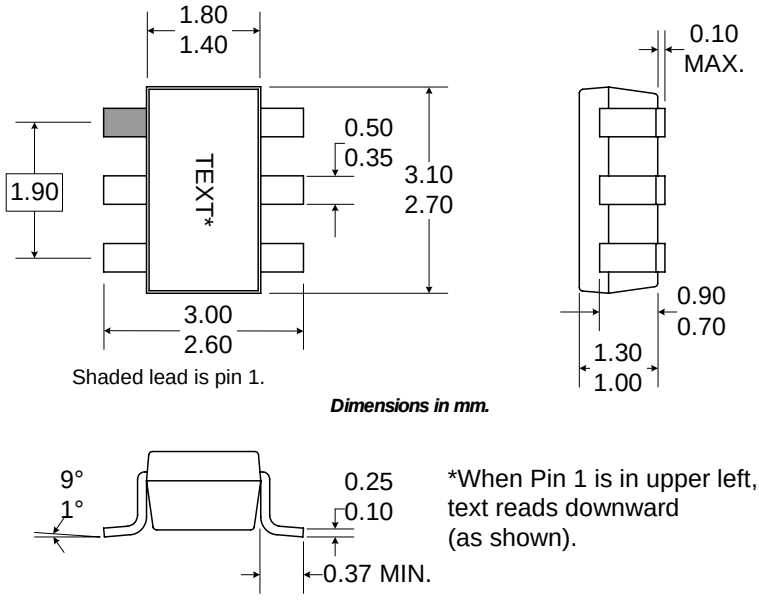
Bypass Possibility

Gain Select	V_{PD}/V_{REF}	V_{CC}	Current	Comments
>1.8V	0V	3V	2.3mA	Recommended Bypass Mode
>1.8V	3V	3V	3.4mA	Alternative Bypass Mode

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Pin	Function	Description	Interface Schematic
1	VREF/PD	For low noise amplifier applications, this pin is used to control the bias current. An external resistor can be used to set the bias current for any V_{PD} voltage.	
2	GND1	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	
3	RF IN	RF input pin.	
4	RF OUT	Amplifier output pin. This pin is an open-collector output. It must be biased to V_{CC} through a choke or matching inductor. This pin is typically matched to 50Ω with a shunt bias/matching inductor and series blocking/matching capacitor. Refer to application schematics.	
5	GND2	LNA emittance inductance. Total inductance is comprised of package+bondwire+stripline (L1) on PCB.	
6	SELECT	This pin selects high gain and bypass. Select ≤ 0.8V, high gain. Select ≥ 1.8V, low gain.	

Package Drawing



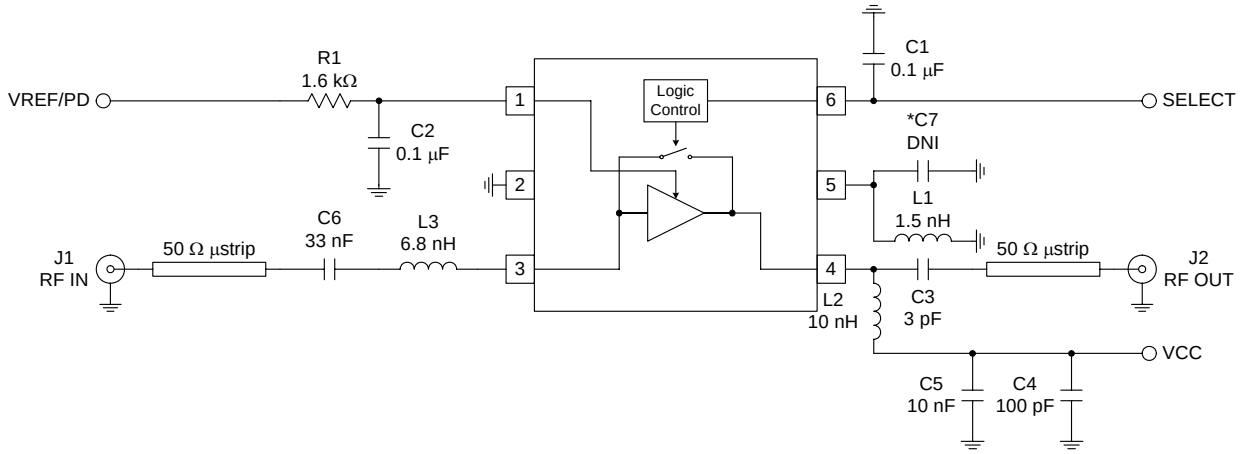
Shaded lead is pin 1.

Dimensions in mm.

*When Pin 1 is in upper left, text reads downward (as shown).

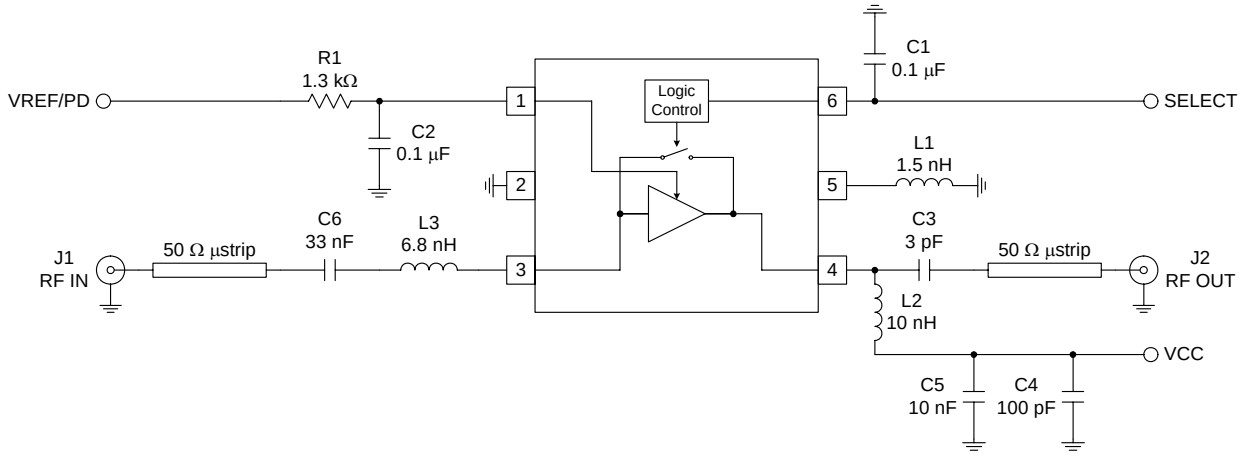
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Application Schematic
Cellular Low Noise Amplifier ~881MHz



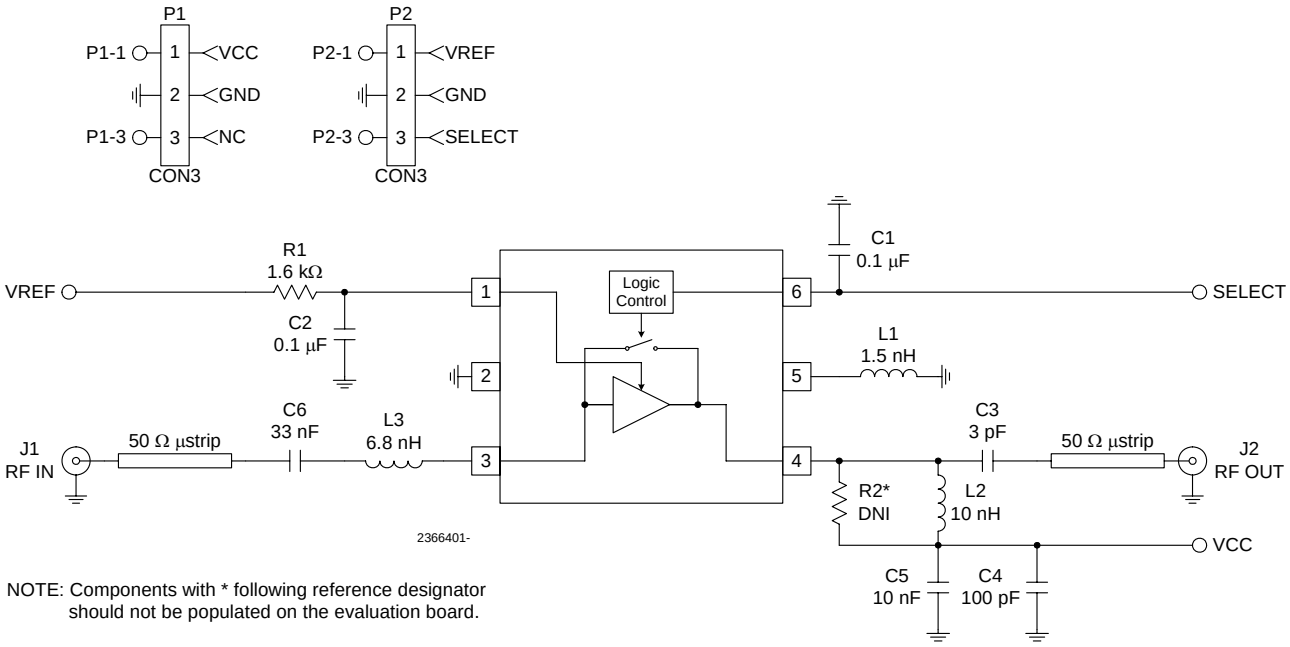
* It is recommended added to initial customer PCBA layout for flexibility to optimize performance.

Application Schematic
Cellular Driver Amplifier ~836MHz



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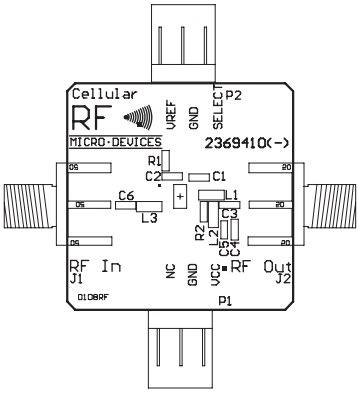
Evaluation Board Schematic - Cellular LNA

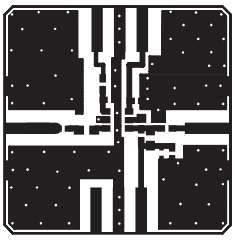


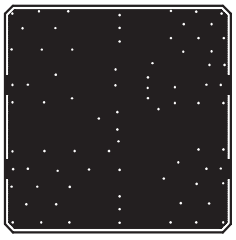
NOTE: Components with * following reference designator should not be populated on the evaluation board.

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Evaluation Board Layout
Board Size 1.0" x 1.0"
Board Thickness 0.032", Board Material FR-4

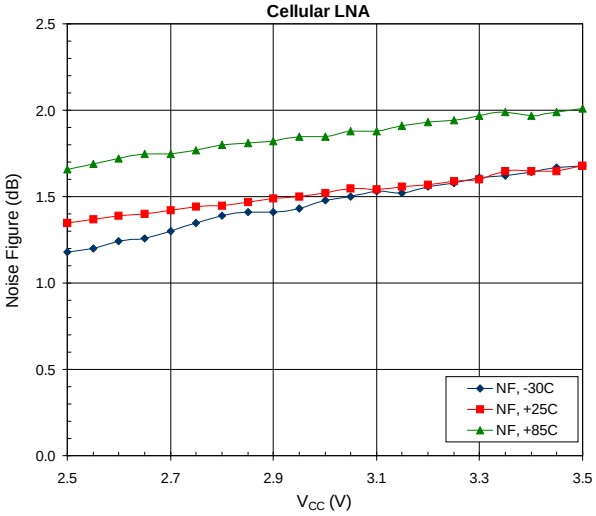




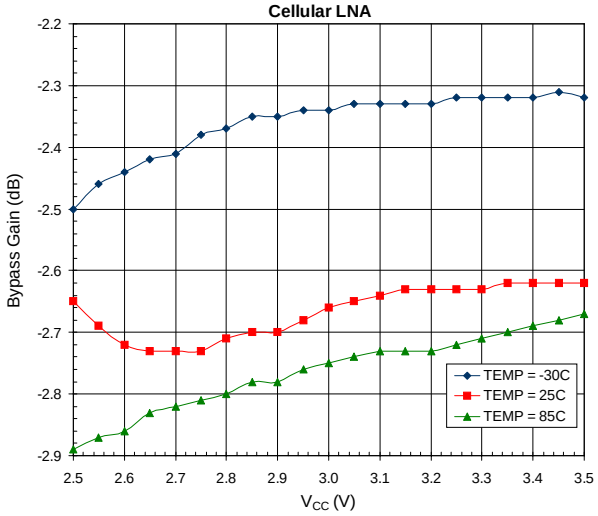


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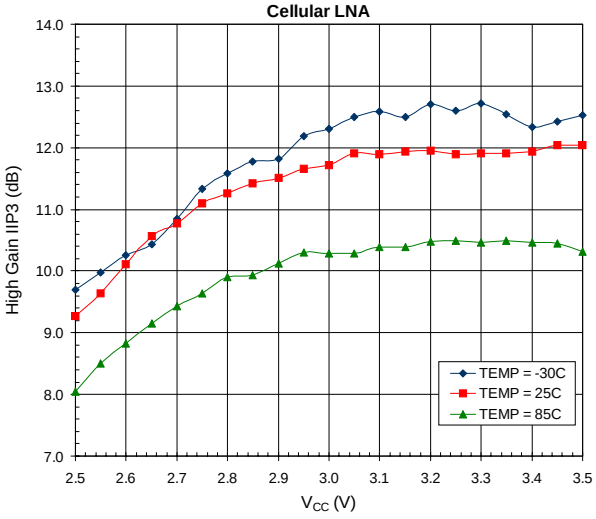
High Gain Mode Noise Figure versus V_{CC}, Cellular LNA



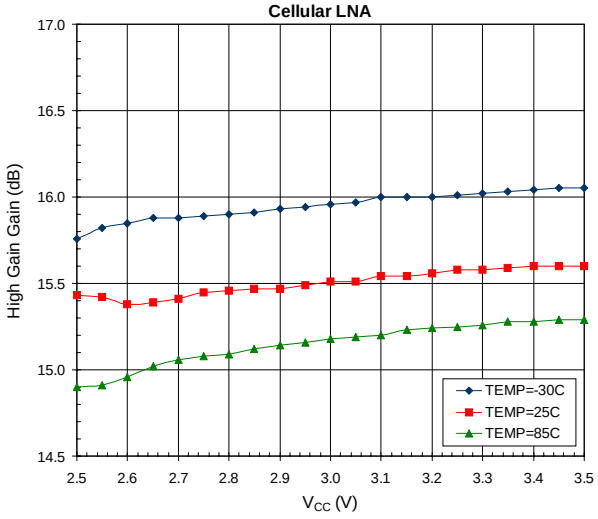
Gain (Bypass Mode) versus V_{CC}, Cellular LNA



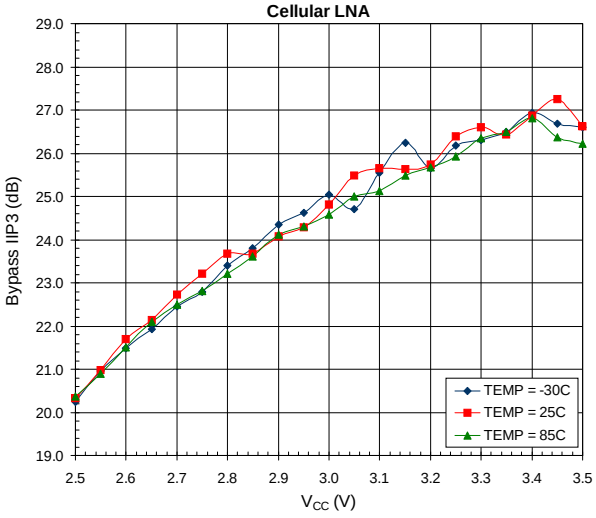
IIP3 (High Gain Mode) versus V_{CC}, Cellular LNA



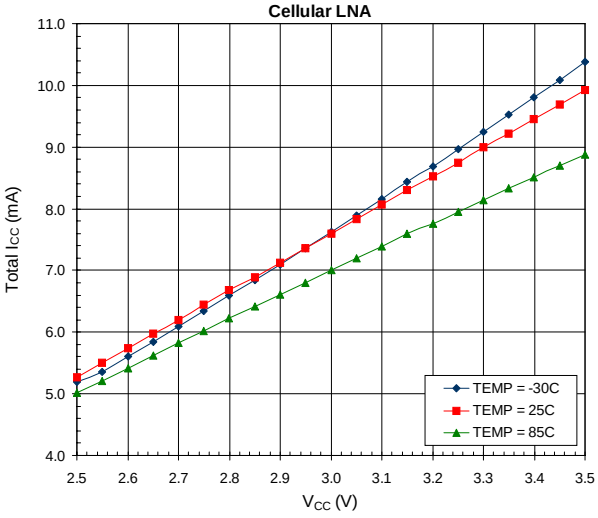
Gain (High Gain Mode) versus V_{CC}, Cellular LNA



IIP3 (Bypass Mode) versus V_{CC}, Cellular LNA

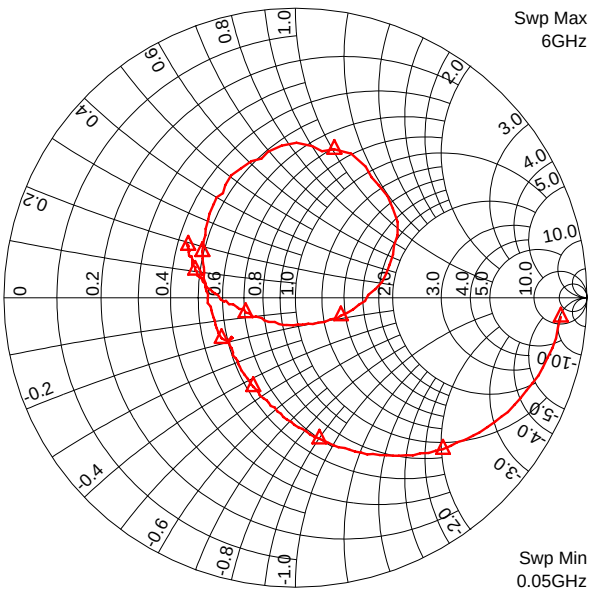


Total I_{CC} (High Gain Mode) versus V_{CC}, Cellular LNA

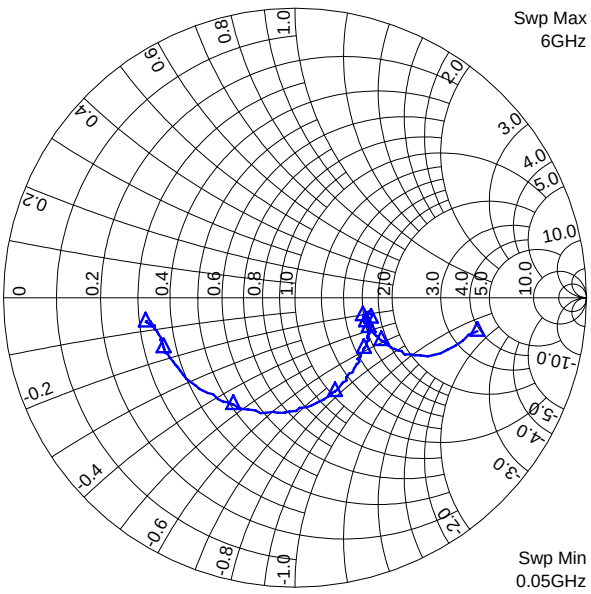


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Bypass

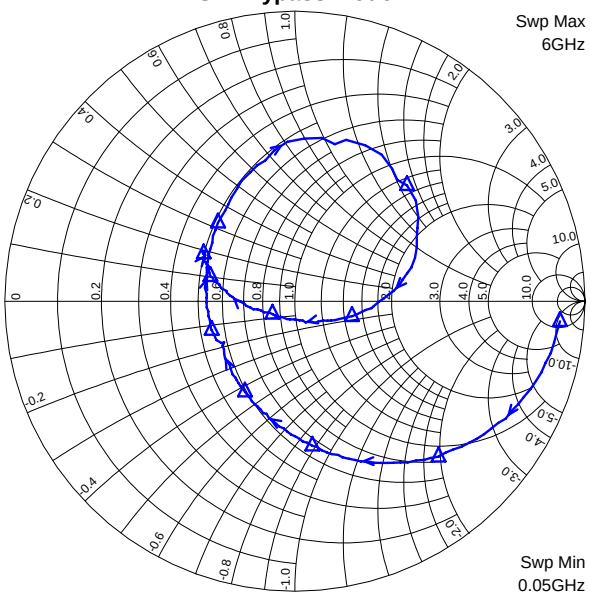


High Gain

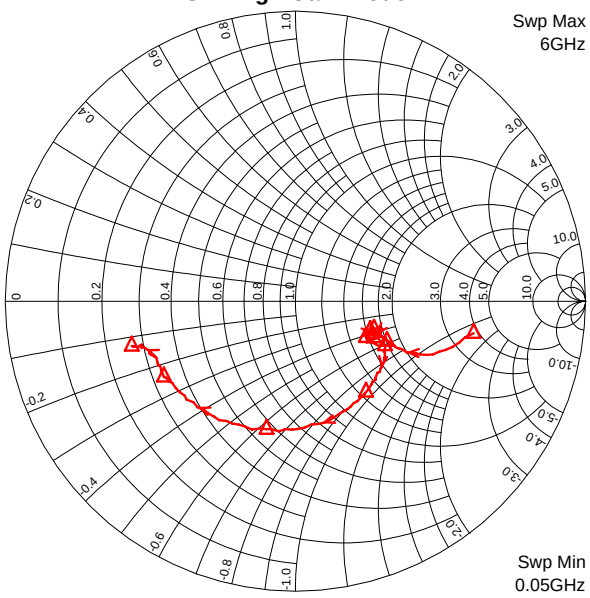


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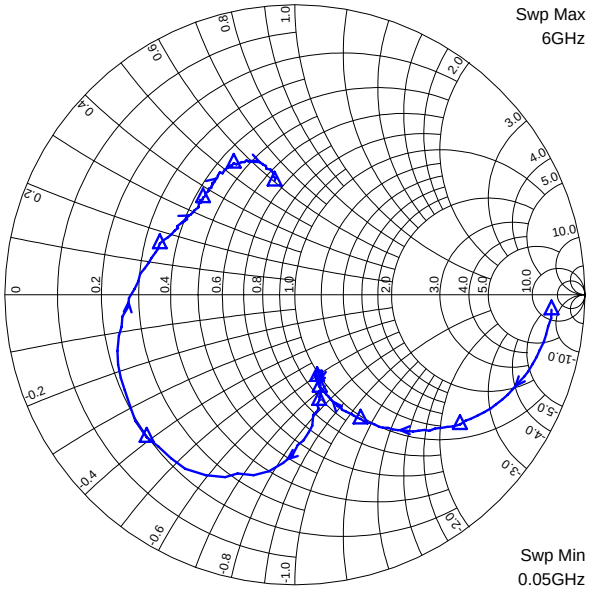
S11 Bypass Mode



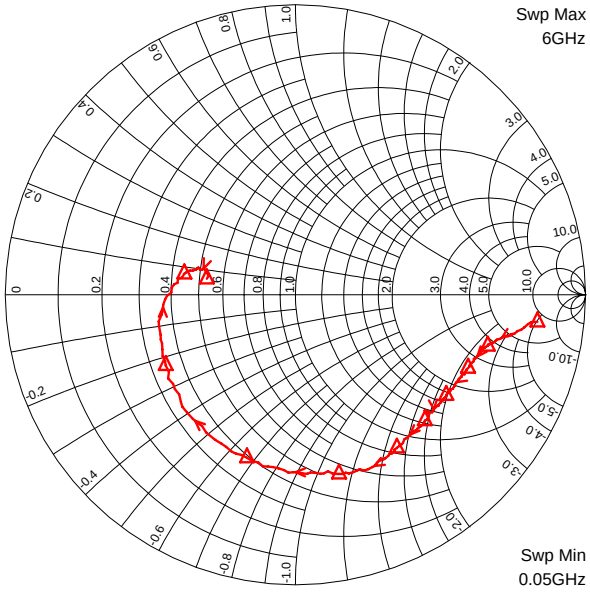
S11 High Gain Mode



S22 Bypass Mode



S22 High Gain Mode



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RoHS* Banned Material Content

RoHS Compliant:	Yes
Package total weight in grams (g	0.013
Compliance Date Code:	435
Bill of Materials Revision:	Rev: B
Pb Free Category:	e3

Bill of Materials	Parts Per Million (PPM)					
	Pb	Cd	Hg	Cr VI	PBB	PBDE
Die	0	0	0	0	0	0
Molding Compound	0	0	0	0	0	0
Lead Frame	0	0	0	0	0	0
Die Attach Epoxy	0	0	0	0	0	0
Wire	0	0	0	0	0	0
Solder Plating	0	0	0	0	0	0

This RoHS banned material content declaration was prepared solely on information, including analytical data, provided to RFMD by its suppliers, and applies to the Bill of Materials (BOM) revision noted above.

* DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

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